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Contaminants in Casco Bay Bird Eggs (2010 State of the Bay Presentation)

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Contaminants in Casco Bay Bird Eggs



Primary Finding:
We found over 100 harmful
toxic pollutants in 15 species of
birds in Casco Bay

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Project Researchers

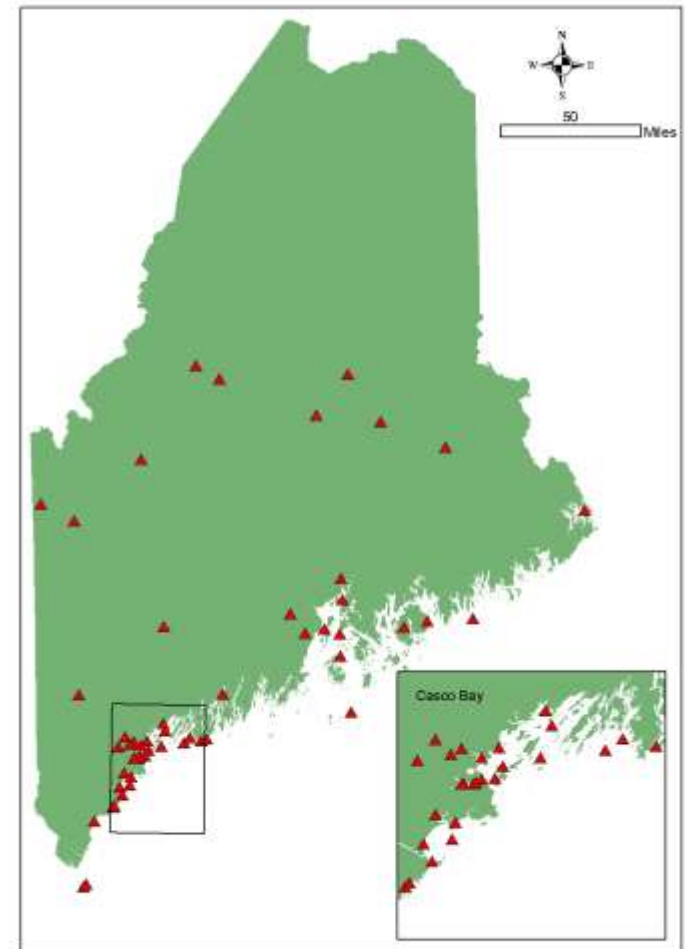


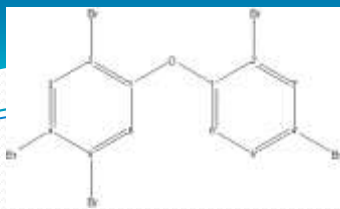
- *Principle Investigator:* Wing Goodale, BioDiversity Research Institute (BRI)
- *Co-Investigators:* David Evers, BRI
- *Collaborators:* Brad Allen and Charlie Todd, Maine Department of Inland Fisheries and Wildlife; Linda Welch, Maine Coastal Islands National Wildlife Refuge; Scott Hall, National Audubon; Julie C. Ellis, Shoals Marine Lab; Dr. Kurunthachalam Kannan, New York State Department of Health
- *Funding Support:* Casco Bay Estuary Partnership, Maine Community Foundation, Maine Department of Environmental Protection Surface Water Ambient Toxics Monitoring Program (SWAT), Maine Outdoor Heritage Fund, John Merck Fund, and U.S. Fish and Wildlife.

The Study



- 192 contaminants: mercury, transformer coolants (PCBs), flame retardants (PBDEs), industrial repellants (PFCs), and organic pesticides (DDT).
- 82 samples (32 in CB), from 30 towns across Maine.
- 23 (15 in CB) species of birds: seabirds, shorebirds, wading birds, waterfowl, perching birds, and raptors (13 osprey eggs in CB).
- 5 habitats: ocean (offshore, inshore), salt marsh, river, lake, and uplands.
- We found all the major contaminants, in all our samples, in every species, and in every habitat.





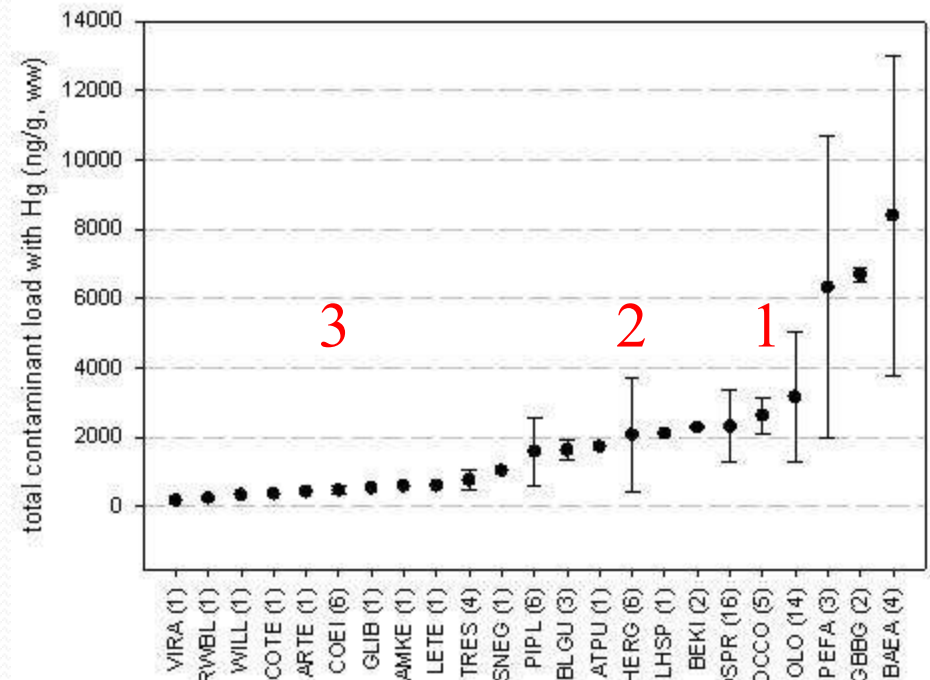
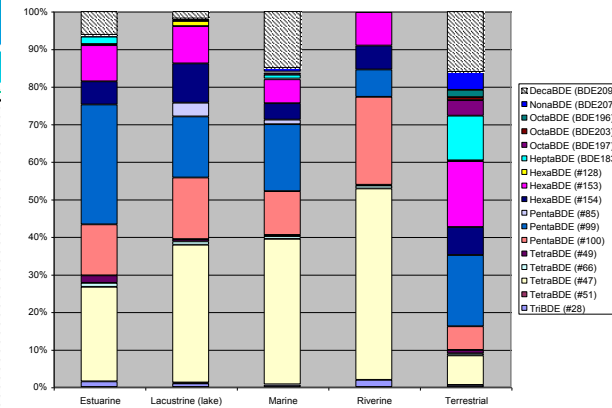
The Contaminants

- **Mercury:** thermometers, dental fillings, fluorescent lights, chlorine production, batteries. *Increasing/stable. Still used*
- **PCBs:** fire retardant, transformer coolants. *Decreasing. Banned*
- **PBDEs:** flame retardant in rugs, electronics, children's sleepwear. *Increasing. Still used*
- **PFC:** stain and water repellant (Scotch Guard, Teflon, fast food containers, microwave popcorn bags, carpeting, antifogging eye glasses). *Increasing/stable. Still used*
- **OCs:** pesticides (DDT). *Decreasing. Most banned*
- **Effects:** neurotoxin, fetal development, reproductive success, reduced immune response, liver and spleen damage, birth defects

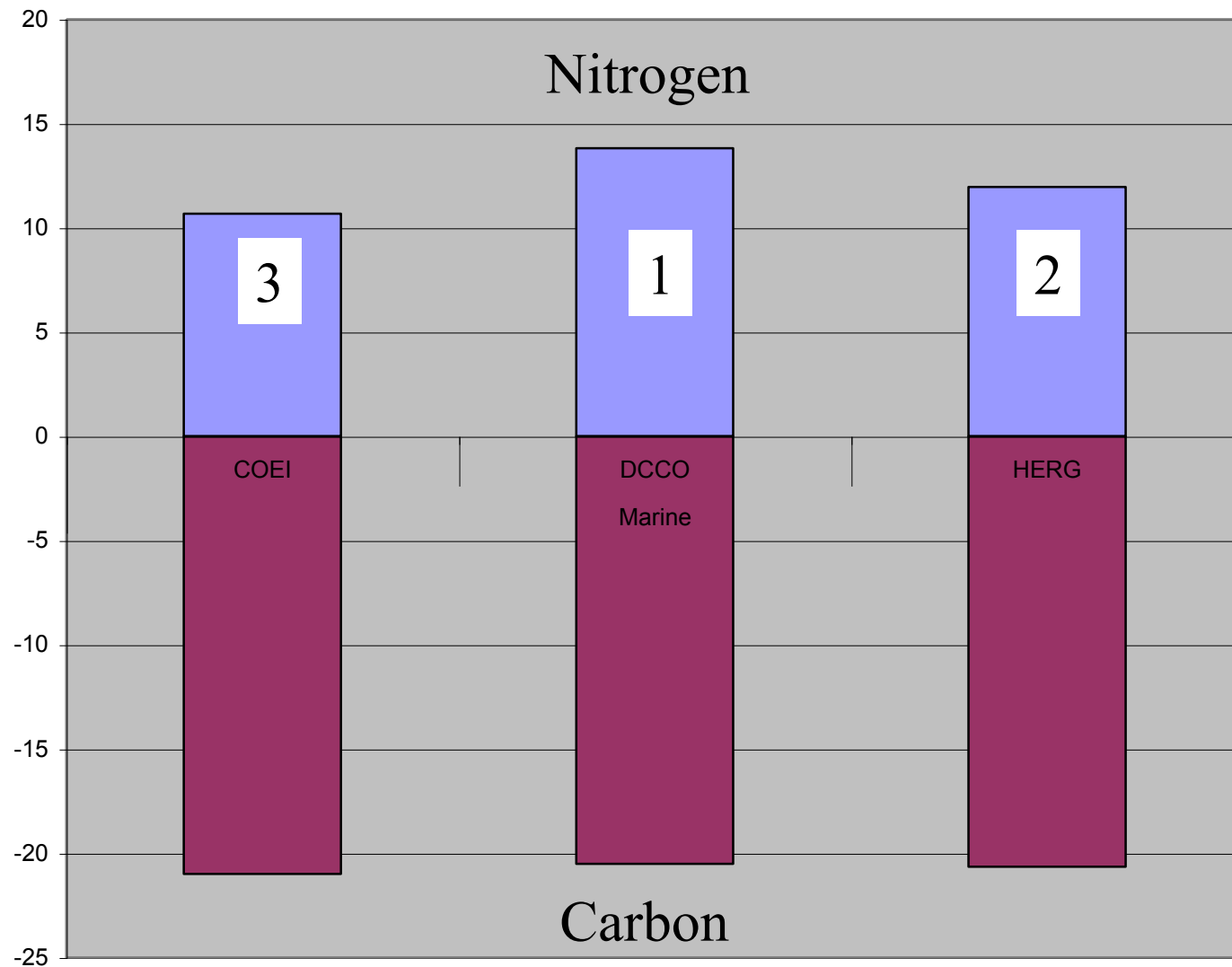
Contaminant Levels

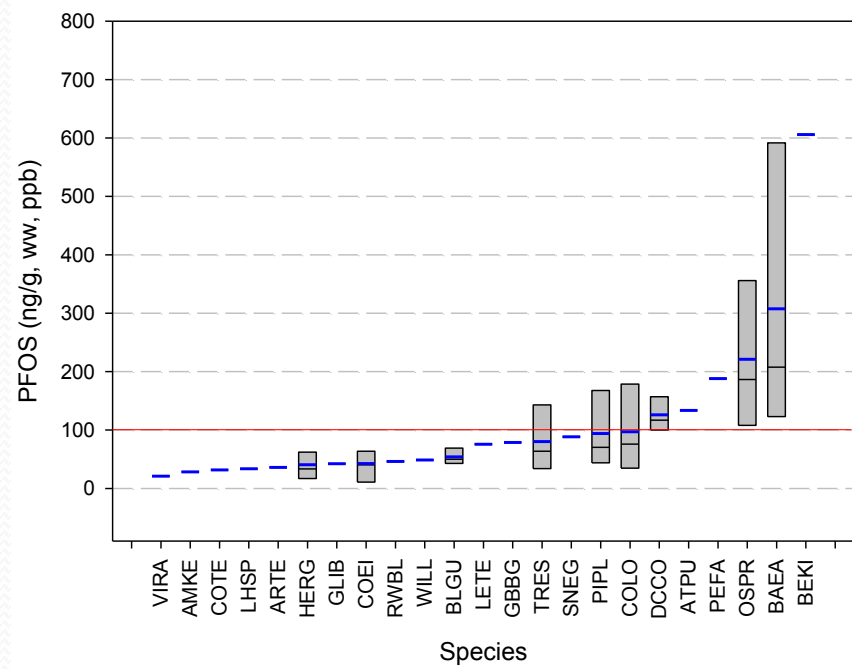
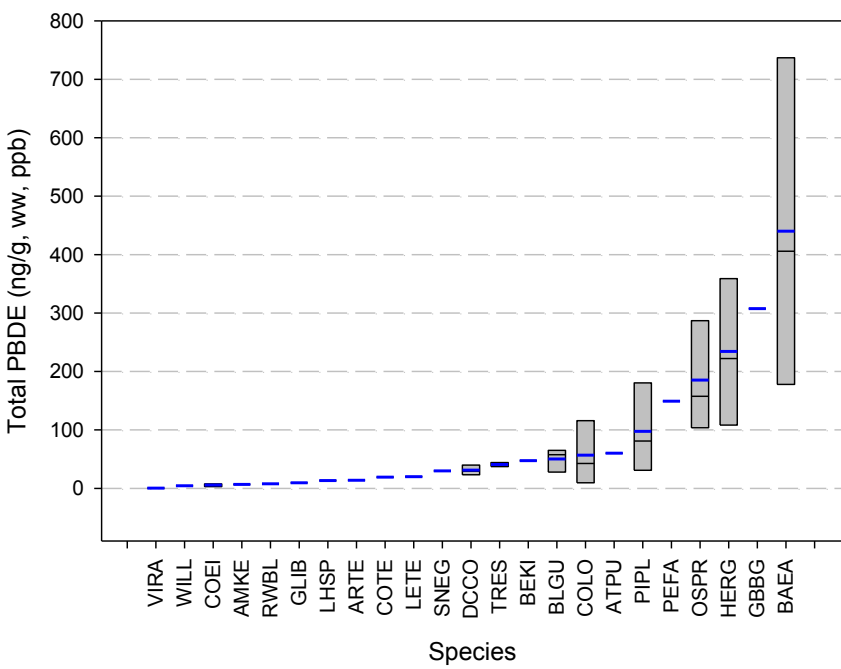
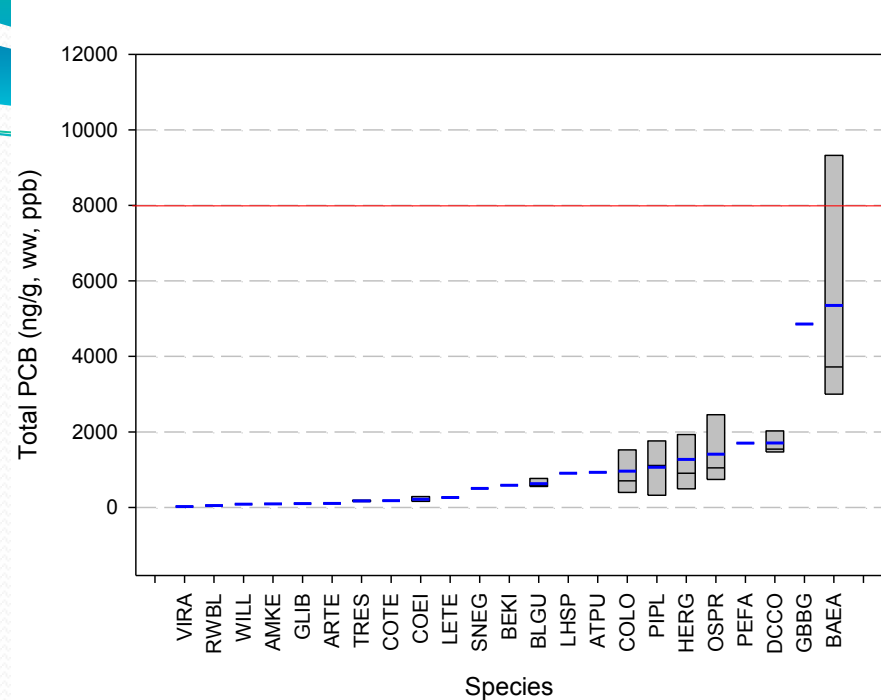
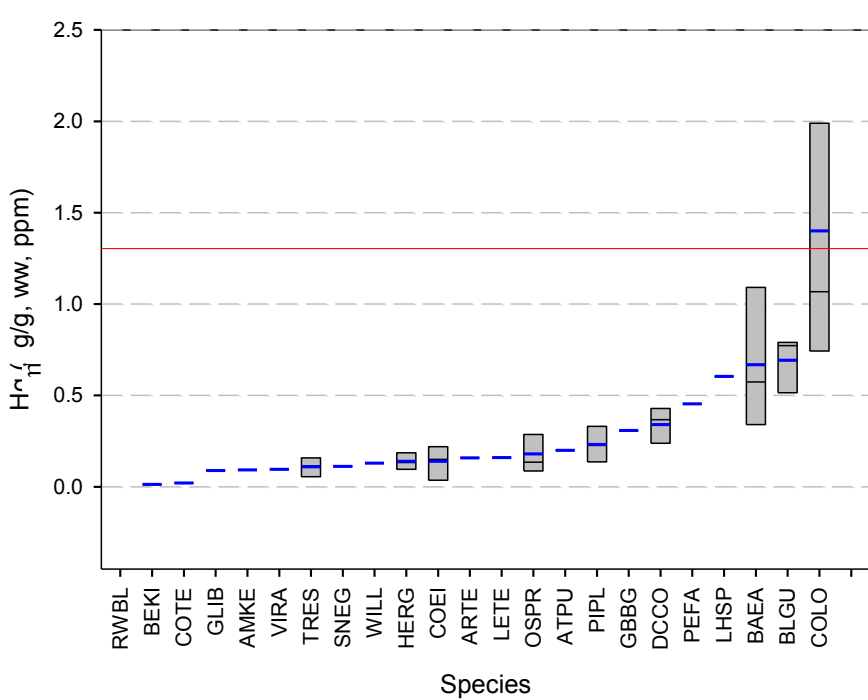


- Industrial stain and water repellants (PFCs) found for the first time in Maine birds.
- PBDE deca found in eight species (10 out of 13 osprey eggs in CB).
- Bald eagles have the highest levels.

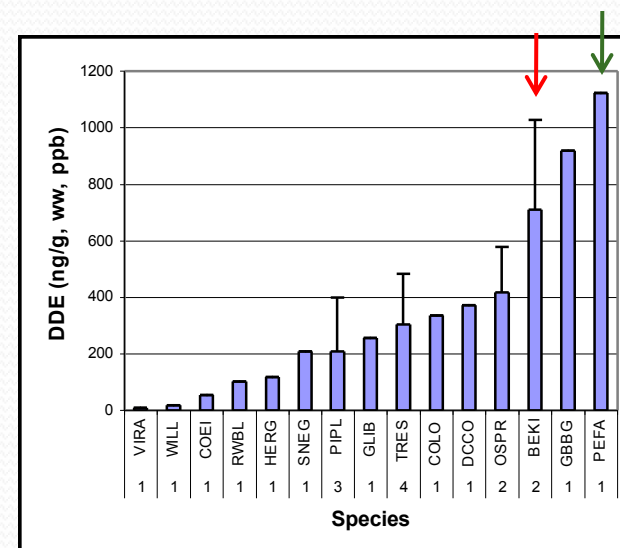
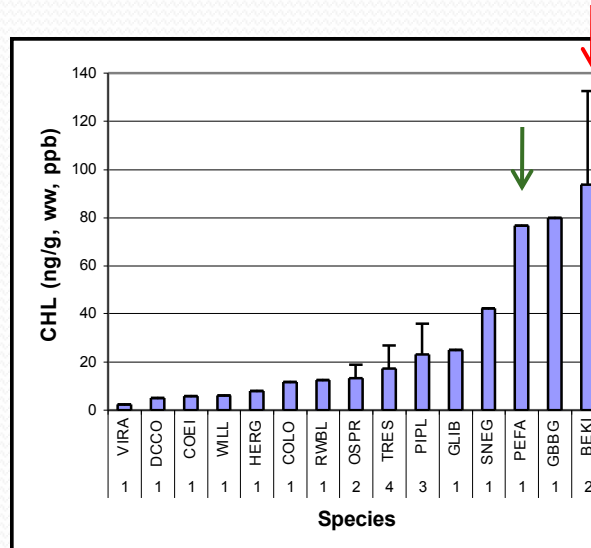
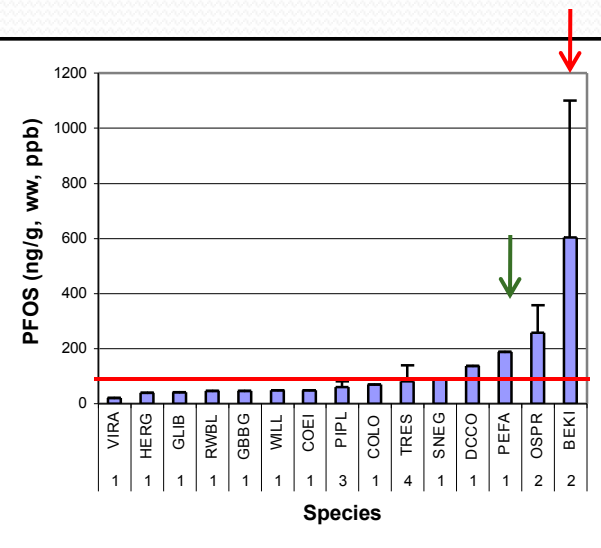
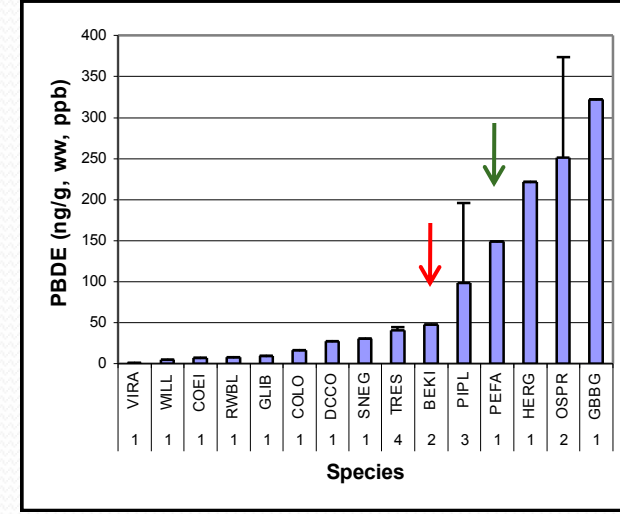
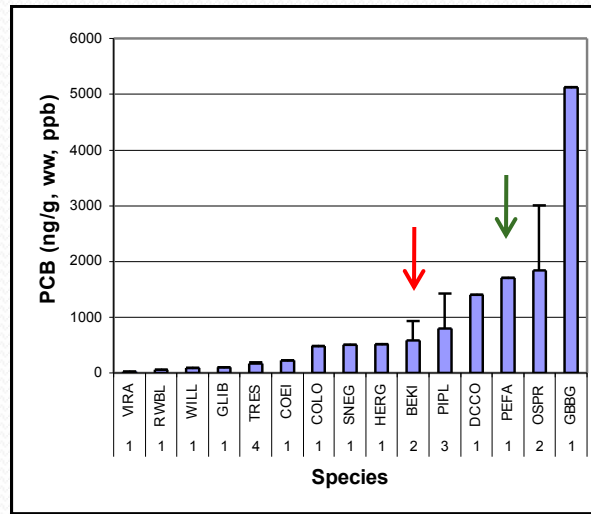
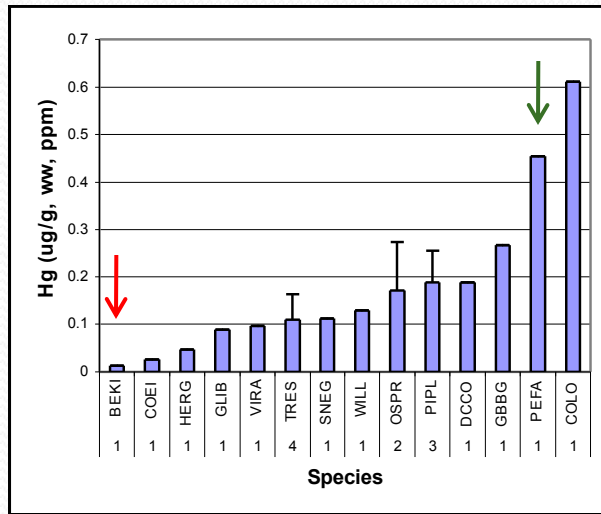


Cormorants feed at the highest trophic level

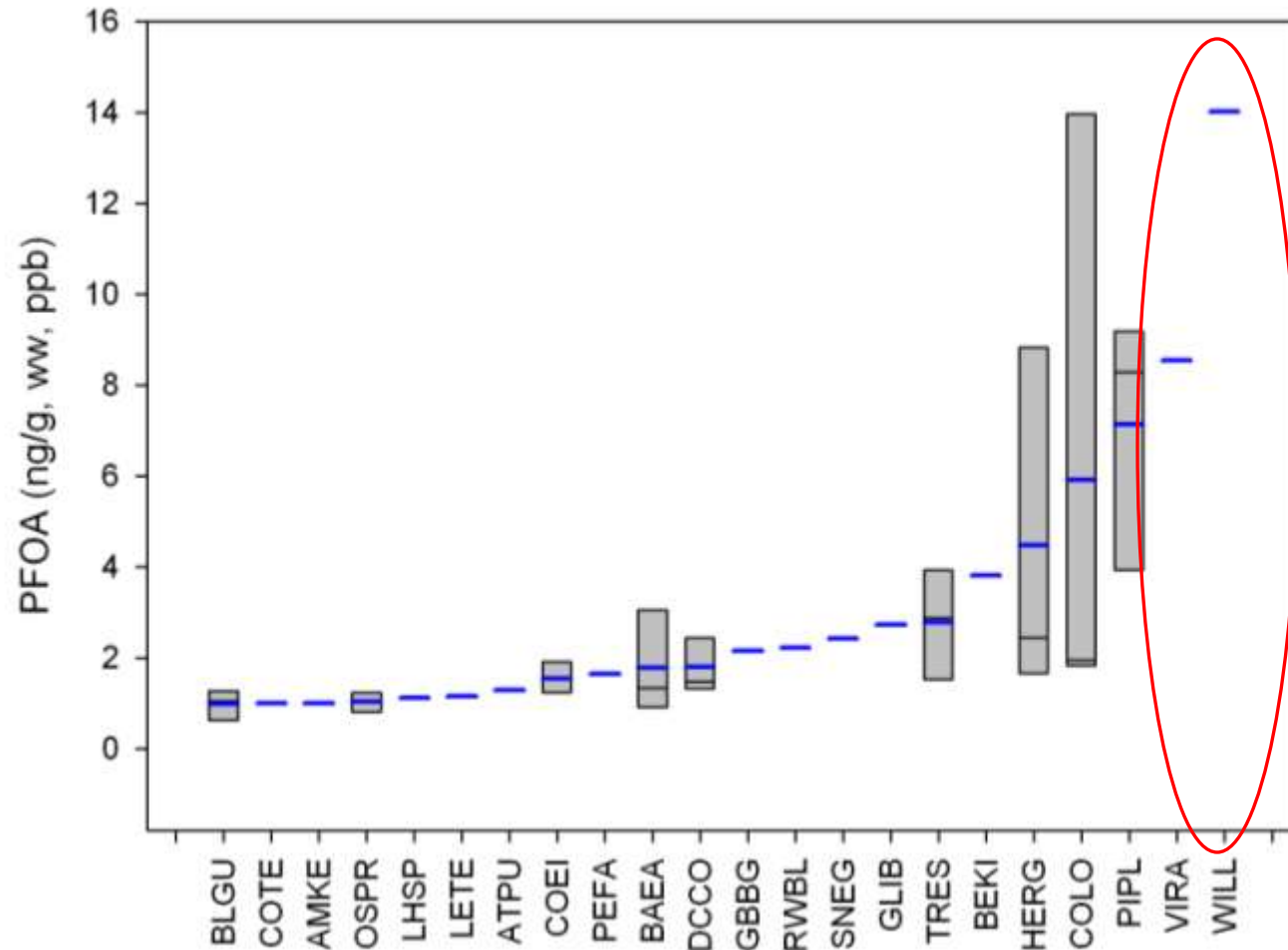




Casco Bay Estuary



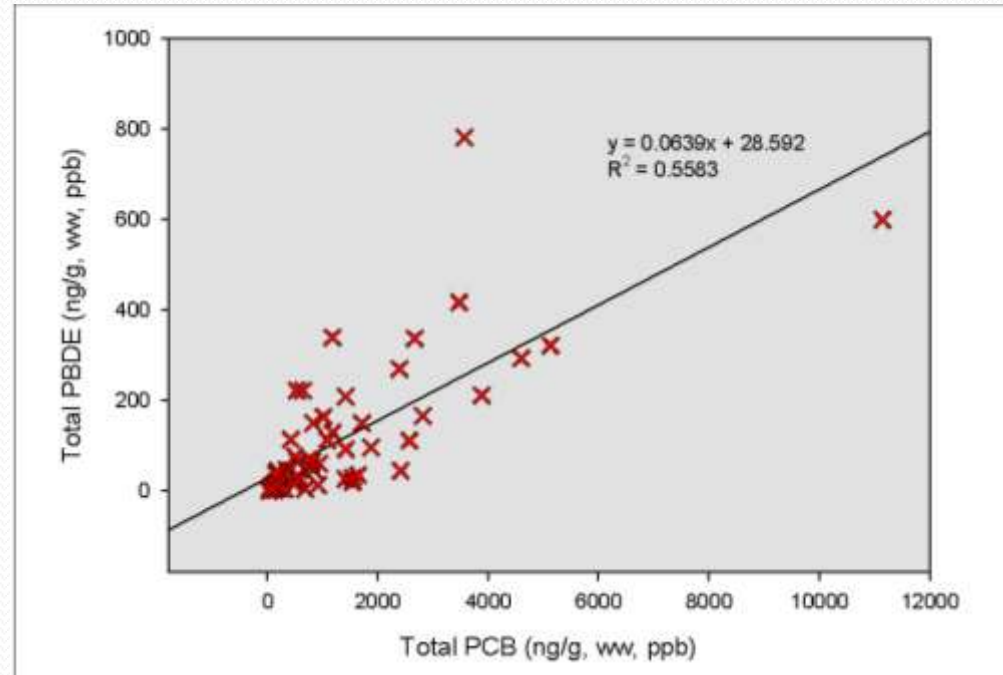
Chemicals used to make Teflon maybe influences by stormwater



Contaminant Impacts



- Some birds have higher contaminant levels than other places in the world.
- Birds with high levels of one contaminant have high levels of other contaminant. Mercury the exception.
- Interaction between toxics
- May be greater effects than we know

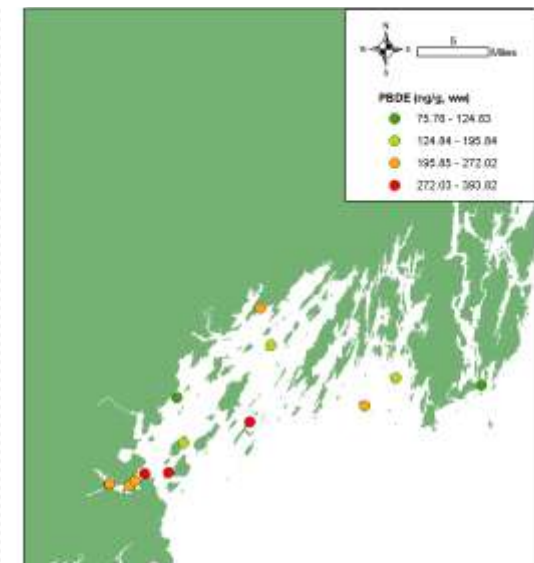
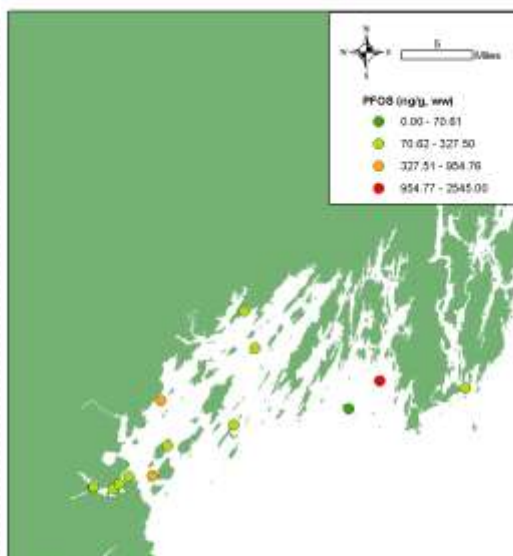
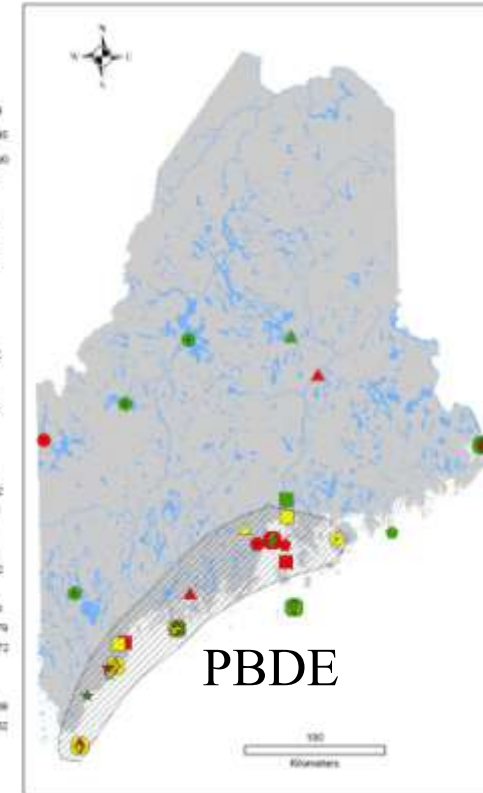
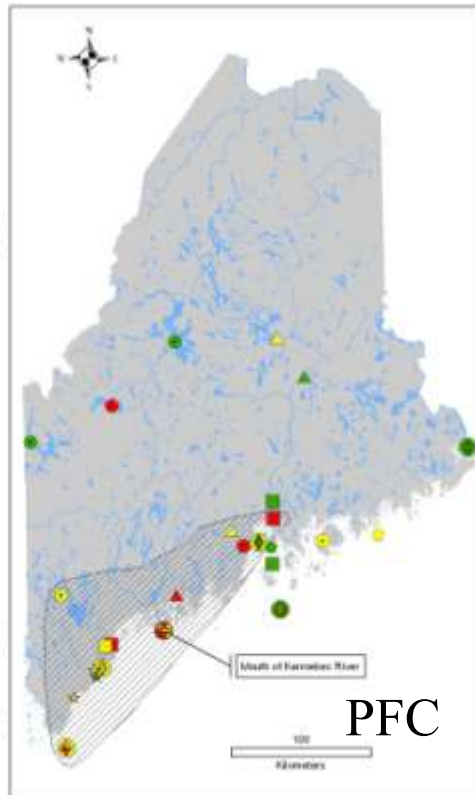


Contaminant Sources

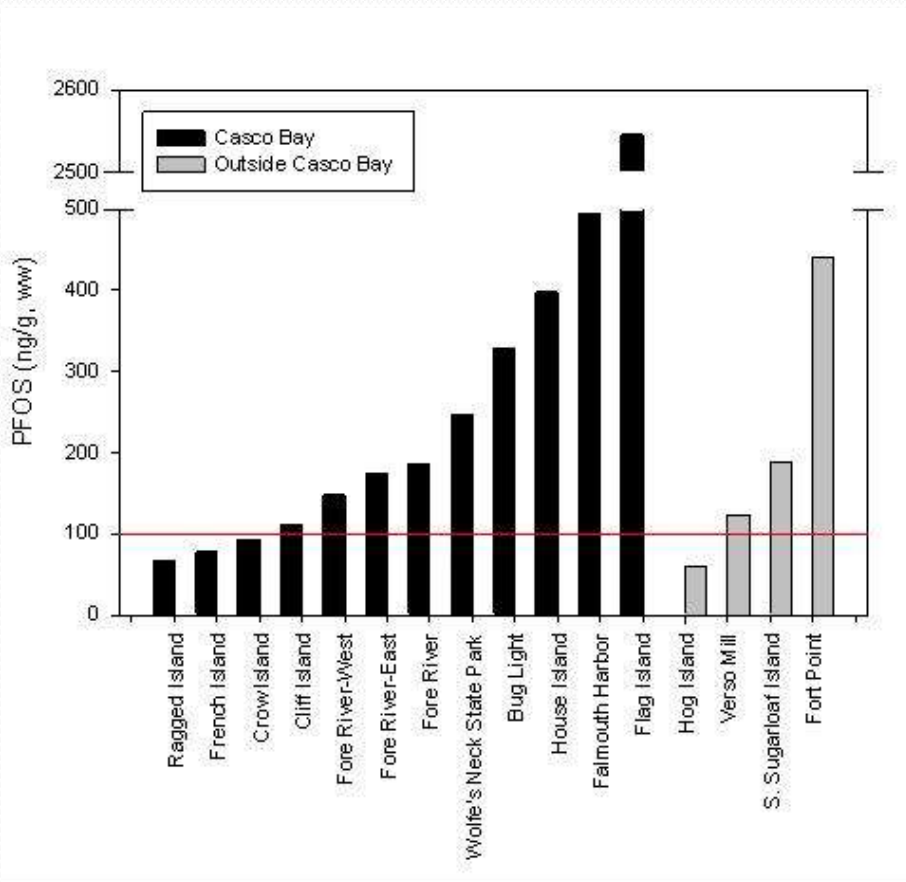


- Contaminants are released to the air, water, and land from our homes, incinerators, water treatment facilities.
- They enter the food web, and accumulate in wildlife.
- The contaminants come from both local and global sources. We found contaminants in all our sample, and at higher levels in southern coastal Maine.

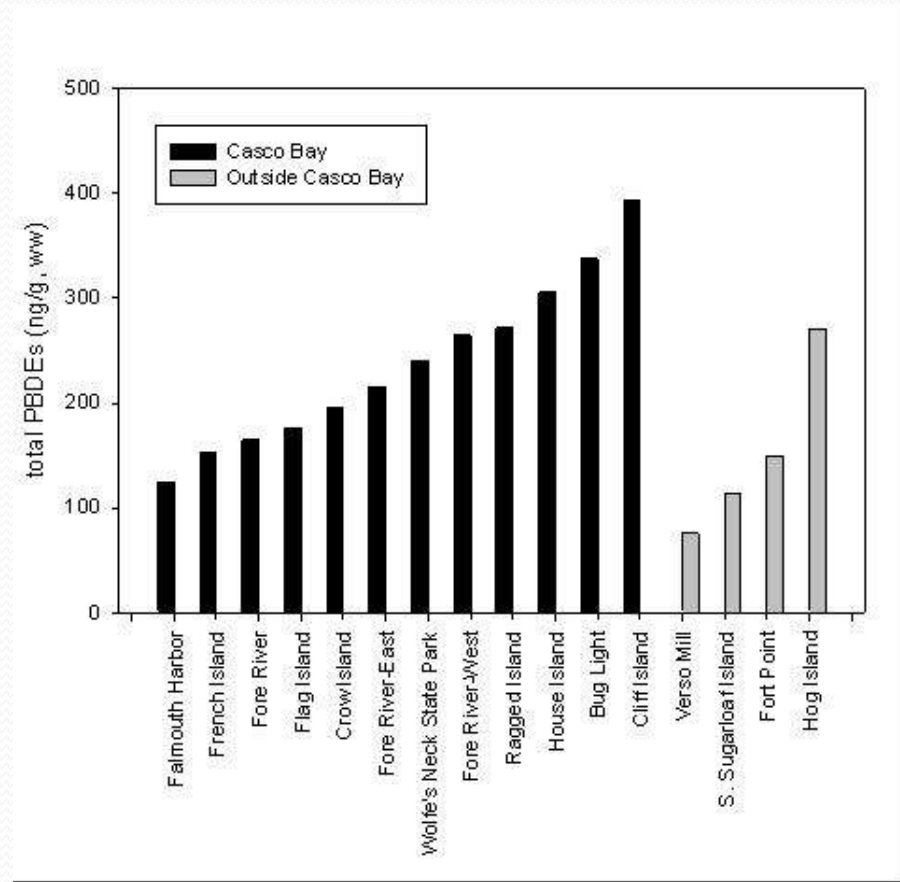
Geographic Variation



Contaminant levels vary from site to site

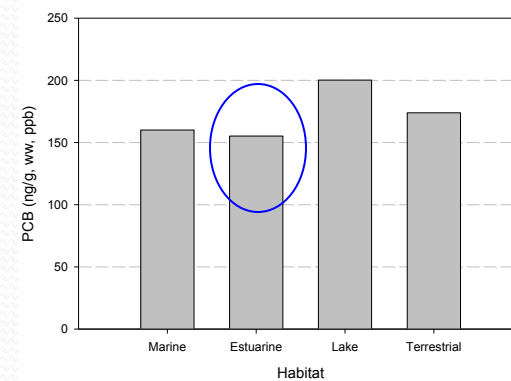
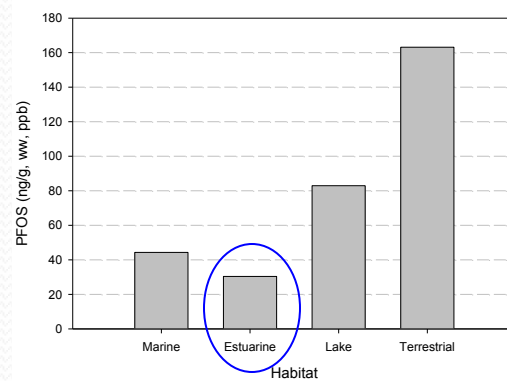
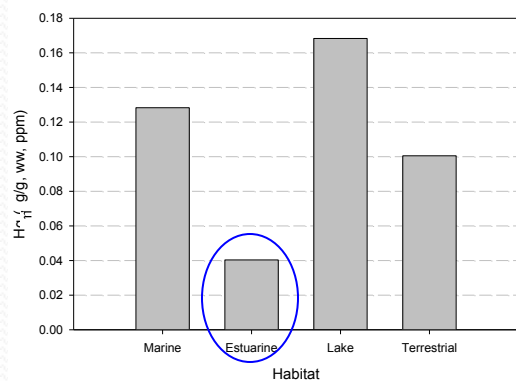
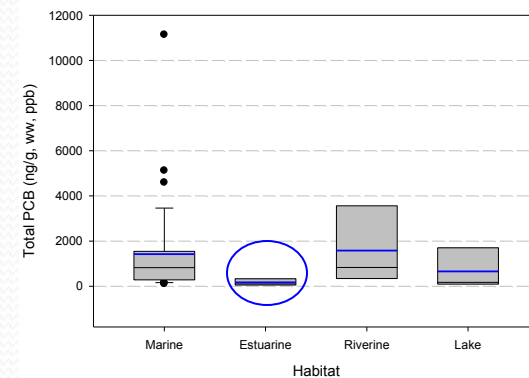
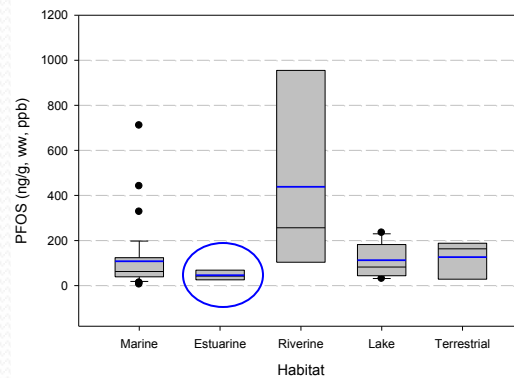
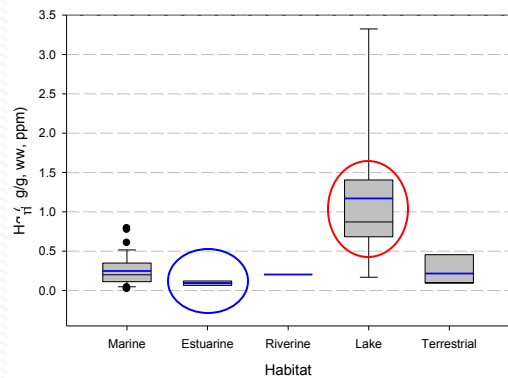


PFOS ng/g, ww



PBDE ng/g, ww

Habitat Influence



What do the results mean?

- Top predators such as bald eagles and peregrine falcons may have greater difficulty raising young.
 - For example: greater difficulty catching prey and surviving adverse conditions.
- Toxic pollutants are pervasive across the entire state in all ecosystems.
 - Birds that feed hundreds of miles offshore, along beaches, in rivers, and in lakes, and on fields.
 - Birds that feed on insects, mussels, fish, other birds, mammals.



Conclusion

Doug Hitchcox



- Toxic pollutants are persistent in the environment.
 - We found DDT, PCBs, and other toxics banned 30 years ago in all our samples.
 - PBDEs and PFCs will likely also be present in wildlife in 30 years.
- When toxic pollutants are no longer used they will decrease in the environment.
 - Common eiders and herring gull PCB levels have decreased by seven fold since the late 1970s.



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